SUPPLEMENT TO REPORT OF PROFESSOR DAVID M. CUTLER

IN RE: NATIONAL PRESCRIPTION OPIATE LITIGATION, CASE NO. 1:17-MD-2804

CASE TRACK 3, LAKE AND TRUMBULL COUNTIES

May 19, 2021

Pursuant to Paragraph 191, FN 160 of my report disclosed on April 16, 2021, I reserved the right to supplement my calculations based on supplemental or revised numbers provided by Dr. Craig McCann. This supplement reflects the numbers provided by Dr. McCann in his report submitted on May 19, 2021, including those reported in in Appendix 14 to his report. In my original report, I relied on three different scenarios presented by Dr. McCann. In this supplement, I rely on two scenarios presented by Dr. McCann: (i) a dispenser analysis based on Appendix 14.G of Dr. McCann's May 19, 2021 report; and (ii) a distributor analysis based on Section VII.A of Dr. McCann's April 16, 2021 report. I have been instructed by counsel to evaluate these two scenarios using the framework presented in in Section IX of my April 16, 2021 report. This supplement further reflects how those two scenarios impact my analyses.

The specific supplemental footnotes, paragraphs, exhibits, and appendices to my report are set forth below. Specifically, I have supplemented footnotes 161-162; paragraphs 191-196 and 208; Exhibits 51-53; and Appendices 12-13. I am also providing two excel files that document the updated calculations set forth in Exhibits 51-53 and Appendices 12-13. The numbering of Exhibits and Appendices conforms to those in my April 16, 2021 report.

May 19, 2021

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Supplemental Discussion: Paragraphs 191-196

191.   I calculate the impact of defendants' misconduct on opioid-mortality under two scenarios evaluated by Mr. Rafalski, Mr. Catizone, and Dr. McCann that estimate the share of all MMEs sold in Trumbull and Lake Counties between 2006-10 that defendants should have identified as suspicious, in each defendant's capacity as either dispensers or distributors. The first scenario evaluates MMEs that defendants should have identified as suspicious in their role as dispensers of prescription opioids based on the opinions of Mr. Catizone, as implemented by Dr. McCann. The second scenario (which I continue to label as Scenario 3 for consistency with my April 16, 2021 report) evaluates the share of MMEs that defendants should have identified as suspicious in their role as distributors, based on the opinions of Mr. Rafalski, as implemented by Dr. McCann.

- Scenario 1 reflects estimates of the share of MMEs that defendants should have identified as suspicious in their role as dispensers, as reported in Section X of Dr. McCann's report.[161] [162]

- Scenario 3 reflects estimates of the share of MMEs that defendants should have identified as suspicious in their role as distributors, as identified by the "Method 1" criteria as reported in Section VII of Dr. McCann's report. This approach identifies transactions in which shipments to a pharmacy by a defendant in their role as a

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[161] See McCann Report, Section X.E and Appendix 14.G.
[162] [deleted]

distributor exceed shipments to the pharmacy in any one of the six preceding calendar months.[163]

192.   Dr. McCann estimates that in their role as dispensers, defendants together accounted for 48 percent of MMEs dispensed in Trumbull County and 59 percent of MMEs dispensed in Lake County between 2006-10.[164] Dr. McCann estimates that in their role as distributors, defendants together accounted for 17 percent of MMEs sold in Trumbull County and 36 of MMEs sold in Lake County between 2006-10. He estimates that between 2006-10, 36 percent of total MMEs in Trumbull County should have been identified as suspicious under Scenario 1 and 69 percent under Scenario 3. Over the same period in Lake County, he estimates that 33 percent should have been identified as suspicious under Scenario 1 and 69 percent under Scenario 3.

193.   As noted, the analysis of Mr. Rafalski, Mr. Catizone, and Dr. McCann, together with my analysis of the impact of shipments of prescription opioids on mortality, yields estimates of the number of deaths attributable to defendants' misconduct. Exhibits 51 and 52 summarize this calculation based on the Scenario 1 analysis. Exhibit 51 describes how these results together yield estimates of deaths attributable to defendant misconduct in 2009-10 and 2018-19. Exhibit 52 summarizes how this analysis is used to estimate estimates for other years.

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[163] See McCann Report, Section VII.A. Shipments in Dr. McCann's distributor analysis are defined as dosage units, which typically reflect tablets or capsules.

[164] Dr. McCann estimates that in their role as distributors, defendants together accounted for 36 percent of MMEs distributed in Lake County and 17 percent of MMEs distributed in Trumbull County between 2006-10.

Exhibit 51

**Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags**

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (2006-2010)	a	59%	48%
Flagged Percent of Defendants' MME (2006-2010)	b	33%	36%
Defendants' Flagged MMEs as Percent of Total	$c=a*b$	20%	17%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	d	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	e	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	$f=d-e$	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	$g=f*c$	0.88	1.08
Percent of Mortality Rate in 2009-2010 Attributable to	$h=g/d$	7%	6%
County Adult Population in 2009-2010	i	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	$j=g*(i/100,000)$	1.6	1.9
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	k	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	l	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	$m=k-l$	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	$n=m*c$	5.16	6.29
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	$o=f+m$	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	$p=g+n$	6.04	7.37
Percent of 2018-19 Mortality Rate Attributable to Defendants	$q=p/k$	18%	15%
County Adult Population in 2018-2019	r	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	$s=p*(r/100,000)$	11.7	12.2

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 14.G.

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

194.   Estimates of opioid mortality attributable to defendants' misconduct in 2009-10 and 2018-19 involve the following steps:

- The regression analysis reported in Appendix 9 Table 1 establishes the estimated magnitude of the relationship across counties between (i) shipments of prescription opioids (measured in MMEs per capita per day) between 1997-2010 and (ii) the change in mortality rates between 1993-95 and 2009-10. The regression model yields a prediction of county-specific average annual opioid mortality expected in the absence of any shipments of prescription opioids in 2009-10 (row e).

- Comparison of actual county-specific mortality (row d) yields an estimate of the increase in the opioid mortality rate attributable to all shipments (row f). Under Scenario 1, 20 percent of total MMEs in Lake County (and 17 percent in Trumbull County) should have been flagged as suspicious by defendants (row c), so I assume that defendants account for 20 percent of the increase in mortality estimated to be attributable to shipments of prescription opioids in Lake County (and 17 percent in Trumbull County). Together, these results imply that defendants' misconduct raised the average annual opioid mortality rate in 2009-10 by 0.88 per 100,000 in Lake County and 1.08 per 100,000 in Trumbull County (row g). Based on area population, this translates to an annual average of 1.6 deaths in Lake County and 1.9 deaths in Trumbull County in 2009-10 that are attributable to defendants' misconduct.

- The county-specific estimate of opioid overdose rates in Trumbull and Lake counties expected in the absence of the illicit crisis in 2018-19 is based on the

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"indirect" analysis, as summarized in Exhibit 50 above. The expected mortality

rates as of 2018-19 based on this approach are reported in row l of Exhibit 51. The

difference between (i) the actual mortality in 2018-2019 (row k); and (ii) expected

mortality (row l) reflects the elevation in the opioid mortality rate between 2009-

10 and 2018-19 due to shipments of prescription opioids (and is reported in row

m).

- I again attribute 20 percent of the incremental mortality in 2018-19 in Lake County

    (and 17 percent in Trumbull County) to defendants' misconduct based on the

    Scenario 1 analysis, as reflect in row c. The resulting estimate of the incremental

    annual mortality rate in 2018-2019 that is attributable to defendants: 5.16 deaths

    per 100,000 in Lake County and 6.29 deaths per 100,000 in Trumbull County (as

    reported in row n).

- The overall average annual impact of the defendants' misconduct in 2018-19 is

    calculated as the sum of the estimates of the impact of defendants' misconduct in

    2009-10 and 2018-19. Together, these results indicate that defendants'

    misconduct elevated the opioid mortality rate by 6.04 deaths per 100,000

    residents in Lake County and by 7.37 deaths per 100,000 residents in Trumbull

    County (row p). This in turn implies that in 2018-19, defendants' misconduct

    resulted in an average of 11.7 deaths per year in Lake County and 12.2 deaths per

    year in Trumbull County (row q).

195. Exhibit 52 extends this analysis to determine the level of mortality that is

attributable to defendants' misconduct for intervening years. Within each period, I determine

the percent of mortality that is attributable to defendants (columns b and f) under the

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assumption that this percentage grew at the same amount per year between 1993-95 and 2009-10 and then between 2009-10 and 2018-19. In Lake County, for example, the percent of mortality attributable to defendants increases from 0 in 1993-95 to 7 percent in 2009-10. For the years in between these two points, the percentage is assumed to increase by the same amount per year. This assumption is favorable to defendants in that it assumes the impact of their misconduct was gradual; an alternative approach would assume that the 7 percent elevation in mortality determined as of 2009-10 applies to all years in which defendants failed to prevent suspicious sales and would generate higher levels of mortality attributable to that misconduct.

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Exhibit 52

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags

Period	Lake County				Trumbull County			
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants
	a	b	$c=a*b$	$d=c*population/100,000$	e	f	$g=e*f$	$h=e*population/100,000$
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0
1996	2.40	0%	0.01	0.0	1.95	0%	0.01	0.0
1997	3.01	1%	0.03	0.1	0.17	1%	0.00	0.0
1998	1.97	1%	0.03	0.1	4.13	1%	0.05	0.1
1999	3.85	2%	0.08	0.1	4.70	2%	0.08	0.1
2000	3.84	2%	0.09	0.2	4.62	2%	0.10	0.2
2001	2.19	3%	0.06	0.1	5.87	2%	0.15	0.3
2002	5.47	3%	0.19	0.3	10.68	3%	0.31	0.6
2003	1.09	4%	0.04	0.1	7.68	3%	0.25	0.5
2004	6.52	4%	0.29	0.5	17.52	4%	0.65	1.2
2005	8.13	5%	0.40	0.7	13.25	4%	0.55	1.0
2006	9.70	5%	0.53	1.0	17.22	5%	0.78	1.4
2007	12.55	6%	0.74	1.4	29.30	5%	1.45	2.5
2008	11.68	6%	0.75	1.4	19.46	5%	1.04	1.8
Avg. 2009-2010	12.68	7%	0.88	1.6	18.75	6%	1.08	1.9
2011	21.96	8%	1.81	3.4	29.51	7%	2.03	3.5
2012	22.17	10%	2.13	4.0	18.09	8%	1.44	2.5
2013	20.49	11%	2.24	4.3	20.62	9%	1.88	3.2
2014	26.11	12%	3.21	6.1	30.75	10%	3.14	5.3
2015	25.65	14%	3.50	6.7	50.64	11%	5.73	9.7
2016	47.70	15%	7.15	13.7	60.86	12%	7.56	12.7
2017	45.25	16%	7.40	14.2	70.64	14%	9.55	15.9
Avg. 2018-2019	34.12	18%	6.04	11.7	50.39	15%	7.37	12.2
Total Deaths Attributable to Defendants (1996-2019)			85.1					90.4

Notes:
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).
Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.E and regression analysis described above.
Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

196.   Overall, the results for Scenario 1 indicate that 90.4 deaths in Trumbull County

and 85.1 deaths in Lake County were attributable to defendants' misconduct for 1996 through

2019. Results of this analysis for Scenarios 1 and 3 are summarized in Exhibit 53.[165]   The

detailed results for each these calculations are presented in Appendix 12.[166]

Exhibit 53

Impact of Defendants on Annual Total Opioid Mortality
Total Number of Deaths Attributable to Defendants, 1996-2019

| | | County | |
| | | Lake County | Trumbull County |
Scenario	Approach		
1	Dispenser Analysis, Non-Recurrent, 2006-2010 [1]	85.1	90.4
3	Distributor Analysis, 2006-2010 [3]	108.1	59.5

Notes:

[1] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 14.G.

[3] Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

Supplemental Discussion: Paragraph 208:

208.   My analysis, together with analysis by other experts, conservatively estimates

that defendants' misconduct resulted in 85 deaths in Lake County and 90 deaths in Trumbull

County between 1996 and 2019, and in turn the host of economic and social problems that

result from excessive opioids. The number of deaths in these counties due to defendants'

misconduct will unfortunately continue to grow in the future as preliminary national data for

2020 indicate that opioid mortality increased from 2019 levels.

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[165] As noted above, these estimates reflect the assumption that the share of total area MMEs that defendants should have flagged in 1997-2005 is equal to that calculated by Rafalski/Catizone/McCann for 2006-10. As a check on the sensitivity of the results to that assumption, I have also estimated the number of deaths attributable to defendants' misconduct under the assumption that defendants' share of area MMEs that defendants should have flagged as suspicious in 1997-2005 is 50 percent of the level estimated for 2006-10. These results, which are presented in Appendix 13, are an average of 22 percent lower than the levels reported in Exhibit 53.

[166] Rafalski/Catizone/McCann report the share of MMEs that should have been identified as suspicious under additional scenarios for both dispensers and distributors. These can be evaluated directly based on the methodology described here and the data and programs produced with this report and Dr. McCann's.

Supplemental Appendix 12: Impact of Defendants on Total Opioid Mortality

Supplemental Appendix Exhibit 12.3

Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 3: Based on McCann Distributor Analysis

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (2006-2010)	a	36%	17%
Flagged Percent of Defendants' MME (2006-2010)	b	69%	69%
Defendants' Flagged MMEs as Percent of Total	c=a*b	25%	11%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	d	12.68	18.75
Beta on Shipments from Model 1		4.04	4.04
Actual Shipments 1997-2010		1.10	1.55
Impact of Shipments as of 2009-2010		4.46	6.25
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	e	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	f=d-e	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	g=f*c	1.11	0.71
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	h=g/d	9%	4%
County Adult Population in 2009-2010	i	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	j=g*(i/100,000)	2.1	1.2
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	k	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	l	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	m=k-l	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	n=m*c	6.56	4.14
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	o=f+m	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	p=g+n	7.67	4.85
Percent of 2018-19 Mortality Rate Attributable to Defendants	q=p/k	22%	10%
County Adult Population in 2018-2019	r	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	s=p*(r/100,000)	14.8	8.0

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

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Supplemental Appendix Exhibit 12.4

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 3: Based on McCann Distributor Analysis

Period	Lake County				Trumbull County			
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants
	a	b	$c=a*b$	$d=c*population/100,000$	e	f	$g=e*f$	$h=e*population/100,000$
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0
1996	2.40	1%	0.02	0.0	1.95	0%	0.01	0.0
1997	3.01	1%	0.04	0.1	0.17	1%	0.00	0.0
1998	1.97	2%	0.04	0.1	4.13	1%	0.03	0.1
1999	3.85	3%	0.10	0.2	4.70	1%	0.05	0.1
2000	3.84	3%	0.12	0.2	4.62	1%	0.06	0.1
2001	2.19	4%	0.08	0.2	5.87	2%	0.10	0.2
2002	5.47	4%	0.24	0.4	10.68	2%	0.20	0.4
2003	1.09	5%	0.05	0.1	7.68	2%	0.17	0.3
2004	6.52	6%	0.37	0.7	17.52	2%	0.43	0.8
2005	8.13	6%	0.51	0.9	13.25	3%	0.36	0.6
2006	9.70	7%	0.67	1.2	17.22	3%	0.51	0.9
2007	12.55	8%	0.94	1.8	29.30	3%	0.95	1.7
2008	11.68	8%	0.95	1.8	19.46	4%	0.69	1.2
Avg. 2009-2010	12.68	9%	1.11	2.1	18.75	4%	0.71	1.2
2011	21.96	10%	2.30	4.4	29.51	5%	1.34	2.3
2012	22.17	12%	2.71	5.1	18.09	5%	0.95	1.6
2013	20.49	14%	2.85	5.4	20.62	6%	1.23	2.1
2014	26.11	16%	4.08	7.8	30.75	7%	2.06	3.5
2015	25.65	17%	4.45	8.5	50.64	7%	3.77	6.4
2016	47.70	19%	9.09	17.4	60.86	8%	4.97	8.3
2017	45.25	21%	9.40	18.1	70.64	9%	6.29	10.5
Avg. 2018-2019	34.12	22%	7.67	14.8	50.39	10%	4.85	8.0
Total Deaths Attributable to Defendants (1996-2019)			108.1					59.5

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section VII.A and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

Supplemental Appendix 13: Impact of Defendants on Total Opioid Mortality – Alternative Treatment of 1997-2005 Shipments

Supplemental Appendix Exhibit 13.1

Impact of Defendants on Annual Total Opioid Mortality
Total Number of Deaths Attributable to Defendants, 1996-2019
Based on 50% of 2006-2010 Average for 1997-2005

| | | County | |
| | | Lake County | Trumbull County |
Scenario	**Approach**		
1	Dispenser Analysis, Non-Recurrent, 2006-2010 [1]	66.6	70.6
3	Distributor Analysis, 2006-2010 [3]	84.6	46.4

Notes:

[1] Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 14.G.

[3] Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.

For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Supplemental Appendix Exhibit 13.2

Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags
Based on 50% of 2006-2010 Average for 1997-2005

		County	
		Lake County	**Trumbull County**
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (1997-2010)	a	59%	48%
Flagged Percent of Defendants' MME (1997-2010)	b	26%	28%
Defendants' Flagged MMEs as Percent of Total	c=a*b	15%	14%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	d	12.68	18.75
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	e	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	f=d-e	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	g=f*c	0.69	0.84
Percent of Mortality Rate in 2009-2010 Attributable to	h=g/d	5%	5%
County Adult Population in 2009-2010	i	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	j=g*(i/100,000)	1.3	1.5
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	k	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	l	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	m=k-l	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	n=m*c	4.04	4.91
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	o=f+m	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	p=g+n	4.73	5.76
Percent of 2018-19 Mortality Rate Attributable to Defendants	q=p/k	14%	11%
County Adult Population in 2018-2019	r	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	s=p*(r/100,000)	9.1	9.5

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section X.E and Appendix 14.G.
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).
For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

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Supplemental Appendix Exhibit 13.3

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 1: Based on McCann Dispenser Analysis with Non-Recurrent Flags
Based on 50% of 2006-2010 Average for 1997-2005

Period	Lake County				Trumbull County			
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants
	a	b	$c=a*b$	$d=c*population/100{,}000$	e	f	$g=e*f$	$h=e*population/100{,}000$
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0
1996	2.40	0%	0.01	0.0	1.95	0%	0.01	0.0
1997	3.01	1%	0.02	0.0	0.17	1%	0.00	0.0
1998	1.97	1%	0.02	0.0	4.13	1%	0.04	0.1
1999	3.85	2%	0.06	0.1	4.70	1%	0.06	0.1
2000	3.84	2%	0.07	0.1	4.62	2%	0.07	0.1
2001	2.19	2%	0.05	0.1	5.87	2%	0.11	0.2
2002	5.47	3%	0.15	0.3	10.68	2%	0.24	0.4
2003	1.09	3%	0.03	0.1	7.68	3%	0.20	0.4
2004	6.52	3%	0.23	0.4	17.52	3%	0.51	0.9
2005	8.13	4%	0.31	0.6	13.25	3%	0.43	0.8
2006	9.70	4%	0.41	0.8	17.22	4%	0.61	1.1
2007	12.55	5%	0.58	1.1	29.30	4%	1.13	2.0
2008	11.68	5%	0.59	1.1	19.46	4%	0.81	1.4
Avg. 2009-2010	12.68	5%	0.69	1.3	18.75	5%	0.84	1.5
2011	21.96	6%	1.42	2.7	29.51	5%	1.59	2.7
2012	22.17	8%	1.67	3.2	18.09	6%	1.13	1.9
2013	20.49	9%	1.76	3.3	20.62	7%	1.46	2.5
2014	26.11	10%	2.51	4.8	30.75	8%	2.45	4.2
2015	25.65	11%	2.74	5.2	50.64	9%	4.47	7.6
2016	47.70	12%	5.60	10.7	60.86	10%	5.90	9.9
2017	45.25	13%	5.79	11.1	70.64	11%	7.46	12.4
Avg. 2018-2019	34.12	14%	4.73	9.1	50.39	11%	5.76	9.5
Total Deaths Attributable to Defendants (1996-2019)			**66.6**					**70.6**

Notes:

Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).

Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section X.E and regression analysis described above.

Mortality attributable to defendants in intervening years based on linear growth in attribution rate.

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Supplemental Appendix Exhibit 13.6

Impact of Defendants on Annual Total Opioid Mortality in 2009-2010 and 2018-2019
Scenario 3: Based on McCann Distributor Analysis
Based on 50% of 2006-2010 Average for 1997-2005

		County	
		Lake County	Trumbull County
Defendants' Flagged MMEs			
Defendants' Percent of Total MMEs (1997-2010)	a	36%	17%
Flagged Percent of Defendants' MME (1997-2010)	b	54%	54%
Defendants' Flagged MMEs as Percent of Total	$c=a*b$	20%	9%
Impact on Mortality through 2009-2010			
Actual Opioid Mortality Rate in 2009-2010	d	12.68	18.75
Beta on Shipments from Model 1		4.04	4.04
Actual Shipments 1997-2010		1.10	1.55
Impact of Shipments as of 2009-2010		4.46	6.25
Predicted Mortality Rate in 2009-2010 (Direct Regression on Change from 1993-95 to 2009-10)	e	8.22	12.50
Mortality Rate in 2009-10 Attributable to All Shipments	$f=d-e$	4.46	6.25
Mortality Rate in 2009-10 Attributable to Defendants	$g=f*c$	0.87	0.56
Percent of Mortality Rate in 2009-2010 Attributable to Defendants	$h=g/d$	7%	3%
County Adult Population in 2009-2010	i	188,356	172,620
Annual Opioid-Related Deaths (2009-2010 Average) Attributable to Defendants	$j=g*(i/100,000)$	1.6	1.0
Incremental Impact on Mortality through 2018-2019			
Actual Opioid Mortality Rate 2018-2019	k	34.12	50.39
Predicted Mortality Rate in 2018-19 (Indirect Regression based on 2009-10 Predicted for 2018-19)	l	7.83	14.02
Incremental Mortality Rate in 2018-19 Attributable to All Shipments	$m=k-l$	26.28	36.37
Incremental Mortality Rate in 2018-19 Attributable to Defendants	$n=m*c$	5.13	3.23
Total Impact on Mortality through 2018-2019			
Total Mortality Rate in 2018-19 Attributable to All Shipments	$o=f+m$	30.74	42.63
Total Mortality Rate in 2018-19 Attributable to Defendants	$p=g+n$	6.01	3.79
Percent of 2018-19 Mortality Rate Attributable to Defendants	$q=p/k$	18%	8%
County Adult Population in 2018-2019	r	193,073	165,166
Annual Opioid-Related Deaths (2018-19 Average) Attributable to Defendants	$s=p*(r/100,000)$	11.6	6.3

Notes: Flagged MMEs based on 2006-2010 MMEs per McCann Section VII.A.
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).
For calculation, flagged MME percentages for 1997-2005 set to 50% of 2006-2010 average.

Supplemental Appendix Exhibit 13.7

Impact of Defendants on Annual Total Opioid Mortality By Year
Scenario 3: Based on McCann Distributor Analysis
Based on 50% of 2006-2010 Average for 1997-2005

Period	Lake County				Trumbull County			
	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants	Actual Mortality Rate	Percent Attributable to Defendants	Mortality Rate Attributable to Defendants	Number of Deaths Attributable to Defendants
	a	b	$c=a*b$	$d=c*population/100,000$	e	f	$g=e*f$	$h=e*population/100,000$
Avg. 1993-1995	1.24	0%	0.00	0.0	0.81	0%	0.00	0.0
1996	2.40	0%	0.01	0.0	1.95	0%	0.00	0.0
1997	3.01	1%	0.03	0.1	0.17	0%	0.00	0.0
1998	1.97	1%	0.03	0.1	4.13	1%	0.03	0.0
1999	3.85	2%	0.08	0.1	4.70	1%	0.04	0.1
2000	3.84	2%	0.09	0.2	4.62	1%	0.05	0.1
2001	2.19	3%	0.06	0.1	5.87	1%	0.07	0.1
2002	5.47	3%	0.19	0.3	10.68	1%	0.16	0.3
2003	1.09	4%	0.04	0.1	7.68	2%	0.13	0.2
2004	6.52	4%	0.29	0.5	17.52	2%	0.33	0.6
2005	8.13	5%	0.40	0.7	13.25	2%	0.28	0.5
2006	9.70	5%	0.52	1.0	17.22	2%	0.40	0.7
2007	12.55	6%	0.74	1.4	29.30	3%	0.74	1.3
2008	11.68	6%	0.75	1.4	19.46	3%	0.54	0.9
Avg. 2009-2010	12.68	7%	0.87	1.6	18.75	3%	0.56	1.0
2011	21.96	8%	1.80	3.4	29.51	4%	1.04	1.8
2012	22.17	10%	2.12	4.0	18.09	4%	0.74	1.3
2013	20.49	11%	2.23	4.2	20.62	5%	0.96	1.6
2014	26.11	12%	3.20	6.1	30.75	5%	1.61	2.7
2015	25.65	14%	3.48	6.7	50.64	6%	2.94	5.0
2016	47.70	15%	7.12	13.6	60.86	6%	3.88	6.5
2017	45.25	16%	7.36	14.1	70.64	7%	4.91	8.2
Avg. 2018-2019	34.12	18%	6.01	11.6	50.39	8%	3.79	6.3
Total Deaths Attributable to Defendants (1996-2019)			**84.6**					**46.4**

Notes:
Mortality rates based on any opioid overdose deaths per 100,000 adults (age 15+).
Mortality attributable to defendants in 2009-2010 and 2018-2019 based on McCann Section VII.A and regression analysis described above.
Mortality attributable to defendants in intervening years based on linear growth in attribution rate.